CLAIMS

I claim:

1 1). A method, comprising:

2   analyzing each routine, of a software program having a plurality of separately

3   compilable routines, to create a plurality of local side-effect problems for

4   each routine; and

5   merging the local side-effect problems to create a global side-effect problem.

1 2). The method of claim 1, further comprising:

2   computing a global solution to the global problem; and

3   splitting the global solution into local solutions.

1 3). The method of claim 2, further comprising:

2   determining for each routine, whether a pointer parameter within the routine

3   is used to write to or read from a storage device.

1 4). The method of claim 3, further comprising:

2   determining for each routine whether the pointer parameter is used to derive

3   a return value of the routine.

1 5). The method of claim 4, further comprising:

2   computing a lattice value associated with each of the pointer parameters,

3   wherein the lattice value comprises one of a PURE effect; LOST effect;

4   RETURN effect; OUT effect; IN effect; RETURN, OUT, and IN effect;

5   RETURN and OUT effect; RETURN and IN effect; and OUT and IN effect.

1 6). The method of claim 5, further comprising:

2   providing the lattice values to an interprocedural analysis solver to optimize

3   compilation of the software program.

1   7). The method of claim 6, further comprising:

2   representing the local side-effect problems as directed graphs having edges

3   and vertices, wherein

4   each edge has an associated monotone transfer function;

5   each vertex has a vertex value, wherein the vertex value is one of formal

6   parameter, implicit parameter, local pointer variable, or gate

7   parameter; and

8   a subset of vertices is marked with lattice values.

1   8). A computer-readable medium having stored thereon a plurality of

2   instructions, said plurality of instructions when executed by a computer,

3   cause said computer to perform:

4   analyzing each routine, of a software program having a plurality of separately

5   compilable routines, to create a plurality of local side-effect problems for

6   each routine; and

7   merging the local side-effect problems to create a global side-effect problem.

1   9). The computer-readable medium of claim 8 having stored thereon additional

2   instructions, said additional instructions when executed by a computer, cause

3   said computer to further perform:

4   computing a global side-effect solution to the global side-effect problem; and

5   splitting the global side-effect solution into local side-effect solutions.

1   10).   The computer-readable medium of claim 9 having stored thereon

2   additional instructions, said additional instructions when executed by a computer,

3   cause said computer to further perform:

4   determining for each routine, whether a pointer parameter within the routine

5   is used to write to or read from a storage device.

1   11).   The computer-readable medium of claim 10 having stored thereon

2   additional instructions, said additional instructions when executed by a

3   computer, cause said computer to further perform:

4   determining for each routine whether the pointer parameter is used to derive

5   a return value of the routine.

1   12).   The computer-readable medium of claim 11 having stored thereon

2   additional instructions, said additional instructions when executed by a computer,

3   cause said computer to further perform,

4   computing a lattice value associated with each of the pointer parameters,

5   wherein the lattice value comprises one of a PURE effect; LOST effect;

6   RETURN effect; OUT effect; IN effect; RETURN, OUT, and IN effect;

7   RETURN and OUT effect; RETURN and IN effect; and OUT and IN effect.

1   13).   The computer-readable medium of claim 12 having stored thereon

2   additional instructions, said additional instructions when executed by a computer,

3   cause said computer to further perform:

4   providing the lattice values to an interprocedural analysis solver to optimize

5   compilation of the software program.

1   14).   The computer-readable medium of claim 13 having stored thereon

2   additional instructions, said additional instructions when executed by a

3   computer, cause said computer to further perform:

4   representing the local side-effect problems as directed graphs having edges

5   and vertices, wherein

6   each edge has an associated monotone transfer function;

7   each vertex has a vertex value, wherein the vertex value is one of formal

8   parameter, implicit parameter, local pointer variable, or gate

9   parameter; and

10   a subset of vertices is marked with lattice values.

1   15).   A system, comprising:

2   a processor;

3   memory connected to the processor storing instructions for interprocedural

4   side-effect analysis executed by the processor;

5   storage connected to the processor that stores a software program having a

6   plurality of separately compilable routines,

7   wherein the processor analyzes each routine, of the software program, to

8   create a plurality of local side-effect problems for each routine; and

9   merges the local side-effect problems to create a global side-effect

10   problem.

1   16).   The system of claim 15, wherein the processor computes a global solution

2   to the global problem; and splits the global solution into local solutions.

1   17).   The system of claim 16, wherein the processor determines for each

2   routine, whether a pointer parameter within the routine is used to write to or

3   read from the storage device.

1   18).   The system of claim 17, wherein the processor determines for each

2   routine whether the pointer parameter is used to derive a return value of the

3   routine.

1   19).   The system of claim 18, wherein the processor:

2 computes a lattice value associated with each of the pointer parameters,

3 wherein the lattice value comprises one of a PURE effect; LOST effect;

4 RETURN effect; OUT effect; IN effect; RETURN, OUT, and IN effect;

5 RETURN and OUT effect; RETURN and IN effect; and OUT and IN effect.

1 20). The system of claim 19, wherein the processor:

2 provides the lattice values to an interprocedural analysis solver to optimize

3 compilation of the software program.

1 21). The system of claim 20, wherein the processor:

2 represents the local side-effect problems as directed graphs having edges

3 and vertices, wherein

4 each edge has an associated monotone transfer function;

5 each vertex has a vertex value, wherein the vertex value is one of formal

6   parameter, implicit parameter, local pointer variable, or gate

7   parameter; and

8 a subset of vertices is marked with lattice values.